

◇ This Month in

ANESTHESIOLOGY

■ Assessing Intraoperative Awareness during Fast-track Cardiac Anesthesia. Dowd *et al.* (page 1068)

Cardiac surgery is associated with a higher incidence of intraoperative awareness than other surgical procedures, ranging from 1.14% to 23% in various studies. But does this hold true with the new trend toward fast-track cardiac anesthesia, which facilitates early tracheal extubation? Over a 4-month period, Dowd *et al.* collected data prospectively on 617 adult patients undergoing cardiac surgery, all of whom received fast-track cardiac anesthesia. Patients were extubated 1–6 h after returning to the cardiovascular intensive care unit (ICU). An ICU research nurse interviewed patients 18 h after extubation to assess whether patients had explicit memories of intraoperative events. The standardized questions asked patients the last thing they remembered before surgery; the next thing they remembered; whether they remembered anything in between these two periods; and whether they had any dreams during the operation. If patients answered “yes” to any of these questions, the research nurse asked a subset of questions to elicit further information, such as whether patients noticed any sounds, touch, pain, or paralysis; whether they tried to alert anyone; and whether there were consequences of these sensations.

Nine patients who died and two who had postoperative confusion did not complete the questionnaire and were excluded from final study results. In 420 (69%) of the patients, the last memory before surgery was in the holding area of the operating suite. In 188 (30.9%) patients, the last memory was lying on the operating table just before induction of anesthesia. Only two patients (0.3%) had explicit memories of intraoperative events, notably, hearing conversation that was later confirmed by operating room personnel. One of these patients described feeling sharp pains in her chest as she was being “sewn up.” However, at 1-yr follow-up evaluation, both patients had normal sleep patterns and reported no adverse psychological sequelae.

The authors attribute the low incidence of intraoperative awareness to their use of intravenous or volatile anesthetic agents at all times during the surgery and to maintenance of appropriate hemodynamic states with vasopressors and vasodilators.

■ Safety and Tolerability of Intrathecal Adenosine in Humans. Rane *et al.* (page 1108)

Rane *et al.* assessed subject tolerance and response to pain after escalating doses (500–2,000 μg) of adenosine administered intrathecally to 12 healthy volunteers. Before the study, participants were not allowed caffeinated beverages and had to abstain from smoking for 12 h. One milliliter of cerebrospinal fluid (CSF) was collected 10 min before and 10 min after the intrathecal injection of adenosine for analysis of CSF concentration. Blood pressure and heart rate were measured before and at 45, 120, and 240 min after adenosine administration. Subjects also underwent reflex testing of the extremities and gross muscle force testing. At 15-min intervals throughout the procedure, they were asked about symptoms such as fatigue, nausea, and dizziness.

Pain thresholds and skin sensitivity to various stimuli (von Frey filaments, ice water, heat, and mustard oil) were determined before and after adenosine administration. Ischemic pain of the forearm was induced using a tourniquet applied for a maximum of 30 min, but these tests were used only in volunteers receiving 1,000 and 2,000 μg of adenosine.

One volunteer experienced transient lumbar pain for 30 min after injection of a dose of 2,000 μg adenosine. Overall, intrathecal adenosine caused a 1,000- to 2,000-fold increase in the CSF concentration, and it reduced, in a non-dose-dependent fashion, the areas of secondary allodynia after skin inflammation, as assessed with brush and von Frey filaments. Intrathecal adenosine also lowered the pain ratings in those who underwent the forearm ischemic pain test. Tactile pain thresholds (TPTs) were significantly reduced by mustard oil inflammation during the control part of the study, whereas treatment with adenosine prevented the TPT reduction. Adenosine appeared not to affect the ice water-induced pain ratings.

■ Which Intervention Best Reduces Preinduction Anxiety in Children? Kain *et al.* (page 1147)

Kain *et al.* randomly assigned children aged 2–8 yr to one of three study groups to determine which intervention works best to reduce children’s preinduction anxiety. Forty-eight of the participants were recruited 2–7 days before surgery while undergoing a behav-

ioral preoperative preparation program; the remaining 40 were recruited the night before surgery. In the parental presence group, children's parents accompanied them to the operating room (OR) and stayed through induction of anesthesia. In the second group, children were premedicated with oral midazolam (0.5 mg/kg) mixed in acetaminophine syrup (10 mg/kg) 20 min before the procedure, then separated from their parents before being taken to the OR. In the third (control) group, children were taken into the OR without a parent or premedication.

The research team obtained pertinent family history and assessed the children's temperaments and coping styles using the Emotionality, Activity, Sociability, and Impulsivity (EASI) and Coping Cards (CC). The State Trait Anxiety Inventory (STAI) was used to assess parent's anxiety levels, and their coping styles were assessed using the Monitor Blunter Style Scale (MBSS). Parents assigned to the parental presence group were given brief instructions regarding talking to, touching, and maintaining eye contact with their child.

In the control and premedication groups, the children's and parents' anxiety levels were assessed as the children were taken to the OR. Anesthesia was induced using O₂/N₂O and halothane *via* scented mask. Each child's anxiety level was assessed at the points of entrance to the OR and introduction of the mask. Parents in the parental presence group were escorted to the waiting room after anesthesia was induced and then were asked to rate their own anxiety. Any adverse effects were noted in the postoperative period, and parents were contacted by telephone 2 weeks after surgery.

There were no differences in children's anxiety in the preoperative holding area, regardless of group assignment. However, children receiving midazolam exhibited significantly less anxiety when separated from their parents. The parents of children in this group also exhibited less anxiety than those in the parental presence group, who had the highest levels of anxiety. Poor compliance during induction of anesthesia was higher in the control group than in either parental presence or midazolam groups. In this study, which used independent assessors of children's anxiety during induction, premedication with midazolam was the most effective intervention for dealing with preinduction anxiety.

■ Ropivacaine and Bupivacaine Compared in Infant, Adolescent, and Adult Rats. Kohane *et al.* (page 1199)

To compare toxicity and sensory selectivity of ropivacaine *versus* bupivacaine, Kohane *et al.* modified a previous infant rat model for studying developmental aspects of local anesthetic action using percutaneous sciatic nerve blockade. Infant rats (aged 5 days), adolescent rats (aged 15 days), and adult rats (aged at least 70 days) were housed in groups and kept on a 12-hour light-dark cycle. Before nerve block injections, rats were anesthetized briefly with halothane *via* face mask. Duration of general anesthesia was less than 2 min. The animals' left legs were used for blocks, with right legs serving as controls. Independent observers blinded to drugs and doses each rat was receiving assessed neurobehavioral and toxic effects. Effectiveness of sciatic nerve block was measured every 15 min. Mechanical sensitivity was assessed by withdrawal to pinch test, whereas heat sensitivity was measured using a modified hotplate test. The team assessed positional placing by pulling the animals' hindpaws back and observing the response (normal = foot returned to position alongside flank, with claws splayed). Motor strength and hopping were also measured and scored. Duration of effective block for mechanical nociception was calculated as the midpoint between the last time point at which there was no response to pinch and the first point at which the animal exhibited a response. Duration of block of thermal nociception was the time required for latency to return to a value of 7 s.

Block duration from ropivacaine was generally the same or slightly shorter than bupivacaine. All indices of toxicity occurred at higher doses/kg for ropivacaine than bupivacaine, at all ages. The LD₅₀ (lethal dose 50%) in infants was 92 mg/kg, whereas in adults it was 30 mg/kg. Plasma concentrations at terminal apnea were higher for ropivacaine than bupivacaine at all ages and were higher in infant than in adult rats. For given absolute doses, sciatic blockade in infant rats lasts longer than in adolescent or adult rats. The authors conclude that the local anesthetic effects of ropivacaine and bupivacaine are similar, but that ropivacaine has a greater margin of safety.

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